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(54) DATA COMMUNICATION EQUIPMENT

(57)Abstract:

PURPOSE: To always prevent the skip of data by monitoring the other equipment transmitting data to its own equipment and erasing an identification code stored in the memory of its own equipment when the stopage of the other equipment is detected.

CONSTITUTION: A receiver always monitors whether a transmitter transmitting data to its own equipment is in a stopping state or not and when the transmitter is in a starting state, operation information is transmitted in a fixed period. Then, at the time when the transmitter is judged to be in the stopping state, the receiver zero-clears a number information memory in the equipment. On the other hand, when the transmitter is in the state of starting, whether data is received or not is discriminated and when data is received, number information received last time is read out of a reception memory. This number information is compared with number information received this time. Then at the time of coincidence, the effect is sent back to the transmitter but at the time of non-coincidence, the memory is updated with number information of this time and the stored identification code is erased to send a response back to the transmitter.

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審査請求　未請求　請求項の数2　FD　（全 7 頁）

(54)【発明の名称】　データ通信装置

(57)【要約】

【目的】　受信データを誤って重複データとみなして破棄することを防止する。

【構成】　受信したデータに付加されている識別コードを読み取りメモリに記憶しておき、データの受信ごとに記憶している前回受信したデータの識別コードと今回受信したデータの識別コードとを比較し、識別コードが一致した場合に今回受信したデータを破棄するデータ通信装置において、データを自装置に送信中の他装置を監視して他装置の停止が検知された場合に自装置内のメモリに記憶されている識別コードを消去する。それにより、前回と同じ識別コードが付加された正当なデータを誤って破棄することがなくなる。
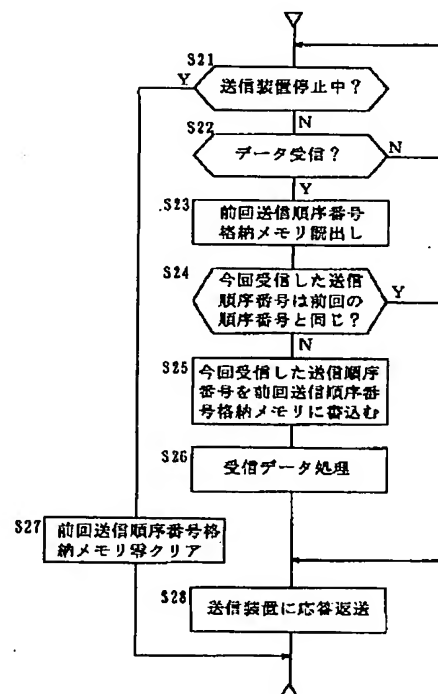
【特許請求の範囲】

【請求項1】　データの送信ごとにサイクリックに変化する識別コードを送信データに付加する手段と、

受信したデータに付加されている識別コードを読み取りメモリに記憶する手段と、

メモリに記憶されている前回受信したデータの識別コードと今回受信したデータの識別コードとを比較し一致しているか否かを判別する手段と、

識別コードが一致した場合に今回受信したデータを破棄する手段と、

を備えたデータ通信装置において、

データを自装置に送信中の他装置を監視して他装置の停止を検知する手段と、

他装置の停止が検知された場合に自装置内のメモリに記憶されている識別コードを消去する手段と、

を備えたことを特徴とするデータ通信装置。

【請求項2】　データの送信ごとにサイクリックに変化する識別コードを送信データに付加する手段と、

受信したデータに付加されている識別コードを読み取りメモリに記憶する手段と、

メモリに記憶されている前回受信したデータの識別コードと今回受信したデータの識別コードとを比較し一致した場合に今回受信したデータを破棄する手段と、

データの受信を失敗した場合に再送信要求を送信元に返送する手段と、

送信先から再送信要求を受信した場合に要求されたデータに同一の識別コードを付加して再送信する手段と、

を備えたデータ通信装置において、

再送信要求されたデータを送信する際に再送信であることを表示する再送信コードを再送信データに付加する手段と、

受信データの識別コードが前回データの識別コードと一致した場合に受信データに再送信コードが付加されているか否かを判別し、再送信コードが付加されている場合に今回受信したデータを破棄する手段と、を備えたことを特徴とするデータ通信装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、データ通信装置に係り、詳しくはデータの二重処理やデータ抜けを防止するため、送信データに他のデータと区別するための識別コードを付加するデータ通信装置に関する。

【0002】

【従来の技術】従来の通信装置間のデータ伝送においては、送信側と受信側で互いに応答確認を取りながらデータの送受信を行なうのが一般的である。つまり、送信側ではデータを送信後、受信側がそのデータを正常に受信したかどうかを、受信側からの応答情報により確認している。送信側では、受信側からの応答情報が受信に失敗したことを示す情報の場合、あるいは一定時間何の応答

も返って来なかった場合（無応答）、再度同じデータを送信し（再送）、確実にデータが受信側に受け取られるようにしている。

【0003】無応答のケースとして、送信側からのデータが何らかの原因で受信側に届かなかった場合と、受信側は正常にデータを受信しそのことを示す応答情報を送信側に返したもののその応答情報が何らかの原因で送信側に届かなかった場合が考えられる。後者の場合、受信側が正常にデータを受信したにもかかわらず、送信側が無応答と判断し同じデータを再送し、受信側でも同じデータを二重に処理することになる。

【0004】そこで本出願人は、この問題点を解決するために特公平3−29215号公報に記載のデータ通信装置を提案した。この装置は、送信側から、送信データに他のデータと区別する番号情報を付加して送信する。それにより、受信側では受信したデータの番号情報と前回に受信したデータの番号情報とを比較し、同一ならばそのデータは処理済みであるとして破棄し、二重処理を防止する。ここでデータに付加される番号情報としては、順次値が変わる一定長のコードを周期的に使用する。例えば、初期値を1とし、次に2、3、4、・・・、n（最大値）とし、最大値nに達したら、初期値の次の値の2に戻り、以後は2、3、4、・・・、nの値を繰り返し使用する。

【0005】すなわち、番号情報記憶用メモリが零クリア（起動および再起動時）される毎に第1回目に送出すべき所定の番号を形成すると共に、第2回目以降に送出する番号情報を第1回目のそれと一致しないように番号情報を形成することにより、送信装置が停止し再起動した時に、停止前に送信した番号情報と同じにならないようにするためである。また、通信装置を常用・予備として二重化（デュープレックス）した場合に、常用側がダウンして予備側が常用側に替わってデータを送信するときに、これまで常用側が送信していた番号情報と同じにならないようにするためである。

【0006】

【発明が解決しようとする課題】しかしながら、上記方法においては極めて少ないケースではあるが、第1回目の番号情報を付加してデータを送信後、第2回目以降の番号情報を付加したデータを送信する前に、送信装置が電源断等により停止した場合、再起動時に再び第1回目の番号情報を付加したデータを送信することになる。この場合、受信装置は、前回受信した番号情報と今回受信した番号情報が同じと判断し、前回の受信データと内容が異なるにもかかわらずデータを破棄し、結果的にデータ抜けという現象を発生する可能性がある。本発明は上記問題点を解決するためになされたもので、その目的とするところは、停止後の再起動時であっても常にデータ抜けを防止することができるデータ通信装置を提供することにある。

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【0007】

【課題を解決するための手段】上記目的を達成するために、第1の発明は、データの送信ごとにサイクリックに変化する識別コードを送信データに付加する手段と、受信したデータに付加されている識別コードを読み取りメモリに記憶する手段と、メモリに記憶されている前回受信したデータの識別コードと今回受信したデータの識別コードとを比較し一致しているか否かを判別する手段と、識別コードが一致した場合に今回受信したデータを破棄する手段とを備えたデータ通信装置において、データを自装置に送信中の他装置を監視して他装置の停止を検知する手段と、他装置の停止が検知された場合に自装置内のメモリに記憶されている識別コードを消去する手段とを備えたことを特徴とする。

【0008】第2の発明は、データの送信ごとにサイクリックに変化する識別コードを送信データに付加する手段と、受信したデータに付加されている識別コードを読み取りメモリに記憶する手段と、メモリに記憶されている前回受信したデータの識別コードと今回受信したデータの識別コードとを比較し一致した場合に今回受信したデータを破棄する手段と、データの受信を失敗した場合に再送信要求を送信元に返送する手段と、送信先から再送信要求を受信した場合に要求されたデータに同一の識別コードを付加して再送信する手段とを備えたデータ通信装置において、再送信要求されたデータを送信する際に再送信であることを表示する再送信コードを再送信データに付加する手段と、受信データの識別コードが前回データの識別コードと一致した場合に受信データに再送信コードが付加されているか否かを判別し、再送信コードが付加されている場合に今回受信したデータを破棄する手段とを備えたことを特徴とする。

【0009】

【作用】第1の発明においては、送信データを受信している間に、データを自装置に送信中の他装置を監視する。ここで他装置の停止が検知されると、自装置内のメモリに記憶されている識別コードを消去する。すると、他装置が停止した後に再起動した場合、次に送信されるデータに付加された識別コードがたまたま前回送信したデータのものと同じであっても、それを受信した自装置は前回の識別コードが消去されているため、同一コードであると判別されることはなく、受信データは破棄されない。

【0010】第2の発明においては、データの受信に失敗して再送信要求が送信元に返送されてデータを再送信する場合に、再送信データに再送信コードが付加される。再送信データが受信されて、その識別コードが前回の受信データと一致した場合は、さらに、再送信コードが付加されているか否かが判別され、付加されていればそのデータは前回受信データと重複しているものとみなされて破棄される。

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【0011】

【実施例】以下、図に沿って本発明の実施例を説明する。図1、図2は第1の発明の実施例を示すであり、図1が送信動作を、図2が受信動作を示すフローチャートである。同様に、図3、図4は第2の発明の実施例を示すであり、図3が送信動作の要部を、図4が受信動作を示すフローチャートである。これらの実施例のデータ通信装置は、同一の送受信機能を備えた1対のデータ通信装置間において、一方の装置から他方の装置でデータ転送する場合の処理動作を送信側、受信側としてそれぞれ示したものである。

【0012】すなわち、ここで用いられる送信装置は、少なくとも識別コードであるところの番号情報を内部メモリの所定領域に記憶し、該情報および再送時に再送信コードであるところの再送情報を送信データに付加して送出する機能を有するものである。また、受信装置は、少なくとも送信されてくる番号情報の前回値を記憶し、これを今回値と比較してチェックを行ない、一致したときに今回データを破棄する機能と、送信装置が停止した場合に前回値を零クリアする機能を有するものである。ここではこれらの機能についての図示を省略した。図1、図3のフローチャート中のデータ送信処理では、データ送信後、受信装置からの応答情報を確認し、正常応答の場合は送信要求および再送要求をリセットし、無応答あるいは異常応答の場合は、送信要求をリセットし再送要求をセットする処理が含まれている。

【0013】最初に、第1の発明の実施例について説明する。この実施例は、受信装置において送信装置の停止を検出すると、装置内の番号情報格納メモリを零クリアすることとした。まず、図1を参照してその送信動作について説明する。起動または再起動時には、内部メモリの零クリアが行なわれる（S11）。次いで、送信要求の有無を判断し（S12）、要求有りならば番号情報格納メモリ（送信順序番号格納メモリ）の内容を読み出す（S13）。要求なしの場合は、S12の判断を繰り返す。ここで、メモリの内容はS1の処理によって“0”であるから、第1回目に送信するデータに付加する番号情報は、S14の処理により“1”加算され“1”となる。

【0014】その結果はAとして示されている。この結果Aが使用すべき最大値（ここでは、15が選ばれている）を越えるか否かを判断し（S15）、越えていないときは上記番号情報メモリにAを書込むと共に、この番号情報を送信データに付加した後（S17）、データの送信を行なう（S18）。以下同様にしてメモリの更新が行なわれ、S15において、A＞15が成立すると、Aは“2”となり（S16）、以下は同様にしてデータの送信が行なわれる。つまり、第1回目だけが“1”となり、第2回目以降は“2”～“15”をサイクリックに送信することになる。

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【0015】次に図2を参照してその受信動作を説明する。受信装置は、常に送信装置が停止状態にあるかどうか監視している（S21）。ここで、送信装置が起動状態にあるときは、動作情報を一定周期で送信しているものとする。受信装置は、送信装置が停止状態にあると判断した場合、装置内の番号情報メモリ（前回送信順序番号格納メモリ）を零クリアする（S27）。送信装置が起動状態の場合（S21N）、次に、データを受信したか否かを判別し（S22）、データを受信しているときは受信メモリから前回受信した番号情報の読出しを行なう（S23）。今回受信した番号情報は、この受信メモリから読み出される前回の番号情報と比較され（S24）、両者が一致したときはその旨を送信装置に返送するが（S28）、一致しないときは今回の番号情報によってメモリの更新を行ない（S25）、受信データに基づいて所定の処理を実行した後（S26）、送信装置に応答を返送する（S28）。

【0016】その結果、受信装置からの応答が何らかの原因で消失して送信装置に届かなかった場合、送信装置は再度同じ番号を付して送信データを送信することになるが、このデータは上述のようにして破棄されるため、二重処理されることはない。また送信装置が起動状態から停止状態となり、その後再起動した場合、停止中は受信装置内の番号情報メモリが零クリアされており、たとえ送信装置が送信順序番号“1”を付加したデータを送信した後停止し、再起動時、再び送信順序番号“1”を付加しても、前回値と一致することはなく誤ってデータが破棄されることはない。なお、この実施例では、起動時のみに初期値として1をセットして、以後は2から繰り返されているが、1から繰り返してもこの実施例では支障なく動作することができる。

【0017】次に、第2の発明の実施例について説明する。この実施例は、送信装置が受信装置から無応答あるいは受信失敗の応答情報を受信し、同じ番号情報を付加したデータを続けて送信（再送）する場合、再送信コードであるところの再送情報を付加する。それにより、受信装置が同じ番号情報を続けて受信したとき、再送情報が付加されていればそのデータを破棄し、付加されていなければ、破棄しないようにしたものである。具体的な動作について、図3を参照して説明する。なお、送信動作は、図1と同様であるので説明は省略する。まず、送信装置は前回のデータ送信の結果、再送が必要であるか否かを判断する（S31）。再送が必要な場合、前回送信時に格納した番号情報を番号情報メモリから読出す（S32）。この番号情報と再送データであることを示す再送情報を送信データに付加した後（S33）、データの送信を行なう（S34）。

【0018】次に、図4を参照してその受信動作を説明する。まず、データを受信したか否かを判別し（S41）、データを受信しているときは受信メモリから前回

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受信した番号情報の読出しを行なう（S42）。今回受信した番号情報は、この受信メモリから読み出される前回の番号情報と比較され（S43）、両者が一致したときは受信データに再送情報が付加されているかどうかを判別する（S45）。再送情報が付加されているときは、その旨を送信装置に返送する（S47）。付加されていないときは、受信データに基づいて所定の処理を実行した後（S46）、送信装置に応答を返送する（S47）。今回の番号情報と前回の番号情報が一致しないときは（S43N）、今回の番号情報によってメモリの更新を行ない（S44）、受信データに基づいて所定の処理を実行した後（S46）、送信装置に応答を返送する（S47）。

【0019】その結果、受信装置からの応答が何らかの原因で消失して送信装置に届かなかった場合は、送信装置は再度同じ番号と再送情報を付して送信データを送信することになるが、このデータは上述のようにして破棄されるため、二重処理されることはない。また、送信装置が起動状態から停止状態となり、その後、再起動したときの最初のデータには、番号情報のみ付加し再送情報は付加せずに送信することになる。したがって、たとえ送信装置が送信順序番号“1”を付加したデータを送信した後停止し、再起動時、再び送信順序番号“1”のデータを送信しても、再送情報が付加されていないため、誤ってデータが破棄されることはない。

【0020】
【発明の効果】以上述べたように第1の発明によれば、データの受信中にデータを送信している送信元の装置を監視することにより、送信元の電断等による停止を検出した場合は自装置内のメモリに記憶されている受信データの識別コードを消去する。その後に再起動して、停止前に送信したデータと同一の識別コードを付加して新たなデータを送信してきても、受信側はその最初に受信したデータを誤って破棄することがなくなり、データ抜けの発生を防ぐことができる。

【0021】第2の発明によれば、データの受信を失敗して再送信が要求された場合に、送信元は、再送信データに再送信コードを付加して再送信するため、そのデータを受信した送信先では、データの識別コードが前回のものと同一であっても、さらに再送信コードが付加されているか否かを判別し、再送信コードが付加されている場合だけ、重複したデータとみなして受信データを破棄する。その結果、送信側の再起動後に、最初に受信された通常データの識別コードが前回受信データとたまたま同じであった場合でも、再送信データに間違われて破棄されることが解消され、データ抜けの発生を防ぐことができる。

【図面の簡単な説明】
【図1】第1の発明にかかる実施例の送信動作を示すフローチャートである。

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【図２】第１の発明にかかる実施例の受信動作を示すフ
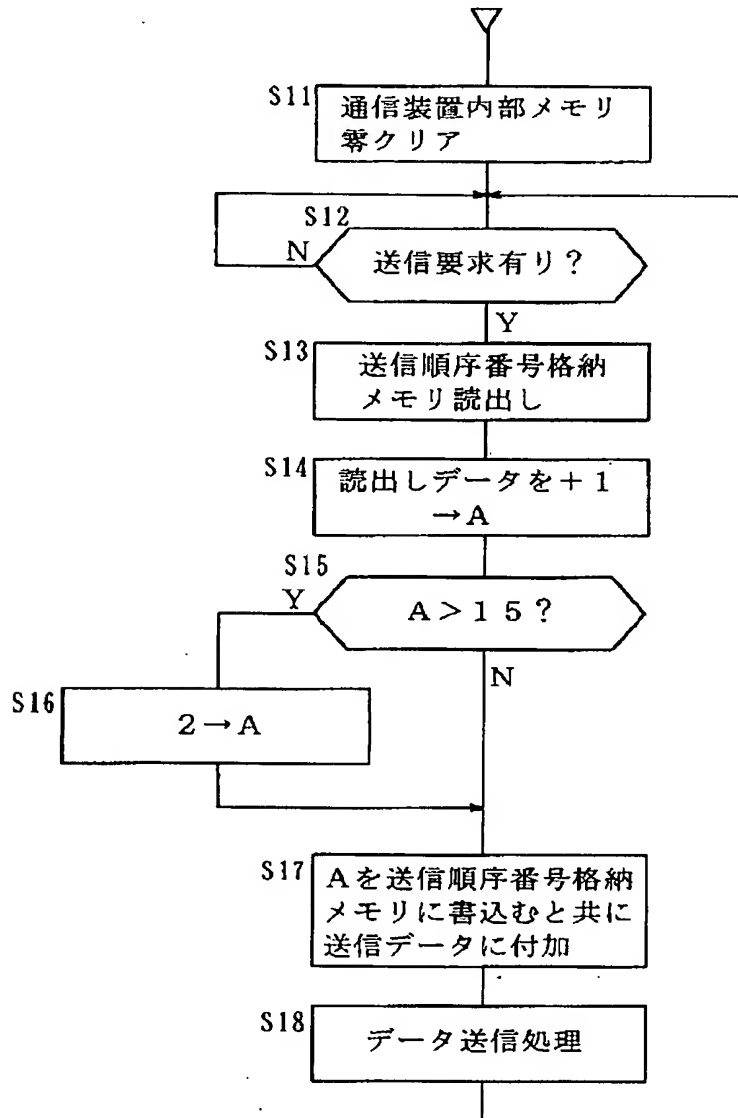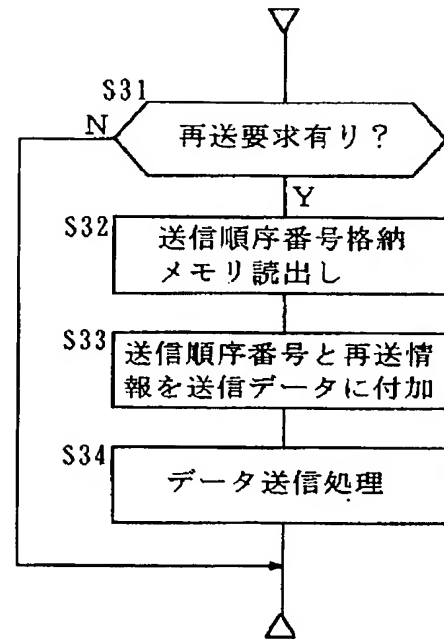ローチャートである。
　【図３】第２の発明にかかる実施例の送信動作を示すフ＊

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＊ローチャートである。
　【図４】第２の発明にかかる実施例の受信動作を示すフ
ローチャートである。

【図１】
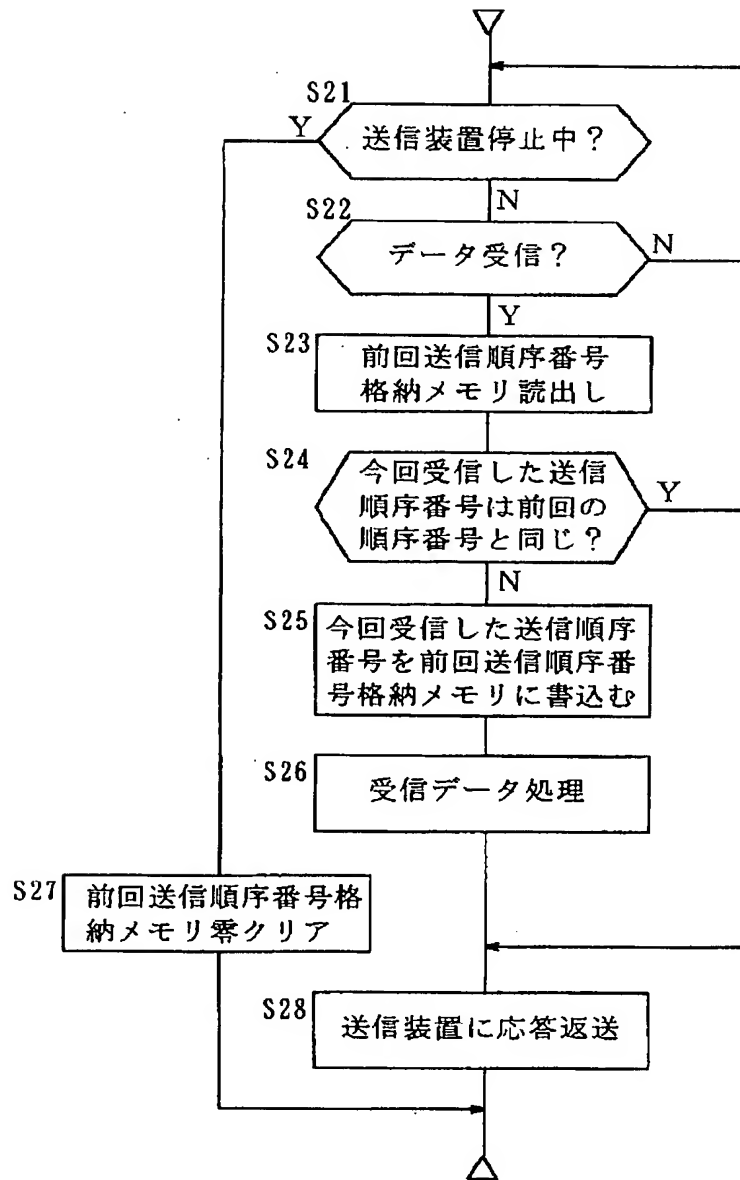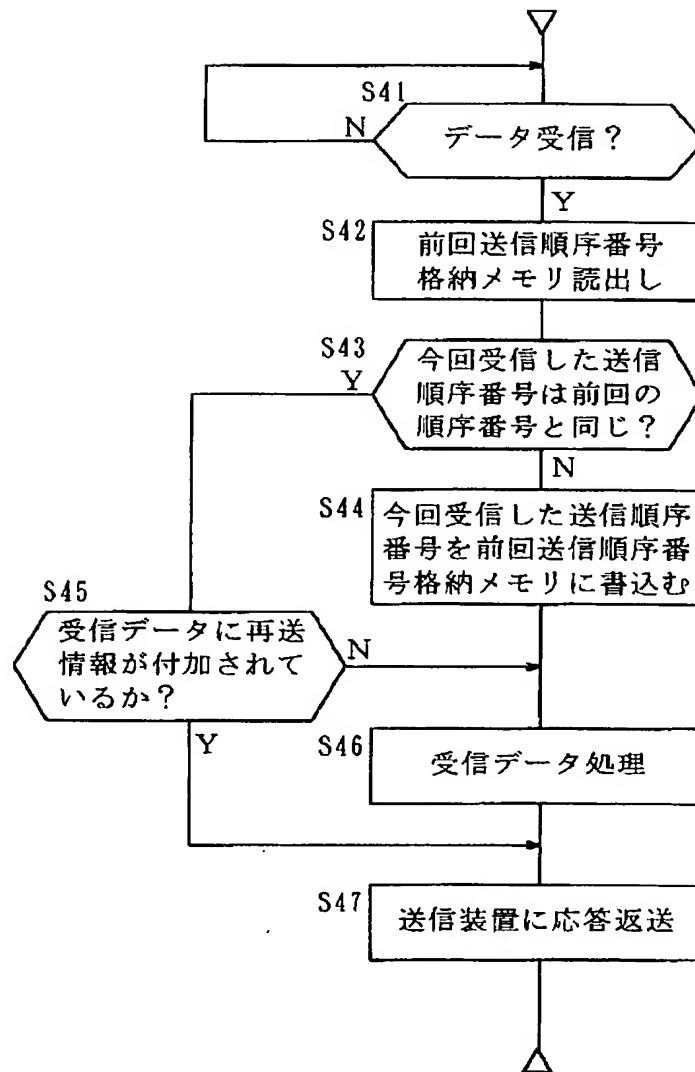
S11　通信装置内部メモリ零クリア

S12　送信要求有り？　N

S13　送信順序番号格納メモリ読出し

S14　読出しデータを＋１→Ａ

S15　Ａ＞１５？　Y

S16　２→Ａ

S17　Ａを送信順序番号格納メモリに書込むと共に送信データに付加

S18　データ送信処理

【図３】

S31　再送要求有り？　N

S32　送信順序番号格納メモリ読出し

S33　送信順序番号と再送情報を送信データに付加

S34　データ送信処理

【図2】

S21 送信装置停止中？ — Y

S22 データ受信？ — N

S23 前回送信順序番号格納メモリ読出し

S24 今回受信した送信順序番号は前回の順序番号と同じ？ — Y

S25 今回受信した送信順序番号を前回送信順序番号格納メモリに書込む

S26 受信データ処理

S27 前回送信順序番号格納メモリ零クリア

S28 送信装置に応答返送

【図4】

S41　データ受信？　　N

S42　前回送信順序番号
　　　格納メモリ読出し

S43　今回受信した送信
　　　順序番号は前回の
　　　順序番号と同じ？　Y　N

S44　今回受信した送信順序
　　　番号を前回送信順序番
　　　号格納メモリに書込む

S45　受信データに再送
　　　情報が付加されて
　　　いるか？　N　Y

S46　受信データ処理

S47　送信装置に応答返送

CLAIMS

[Claim(s)]
[Claim 1] A means to add the identification code which changes cyclically for every transmission of data to transmit data, A means to read the identification code added to the received data, and to memorize in memory, A means to distinguish whether the identification code of data received last time memorized by memory is compared with the identification code of data received this time, and it is in agreement, In the data communication unit equipped with a means to cancel the data received this time when identification code was in agreement The data communication unit characterized by having a means to supervise other equipments while transmitting data to self-equipment, and to detect a halt of other equipments, and a means to eliminate the identification code memorized by the memory in self-equipment when a halt of other equipments is detected.
[Claim 2] A means to add the identification code which changes cyclically for every transmission of data to transmit data, A means to read the identification code added to the received data, and to memorize in memory, A means to cancel the data received this time when the identification code of data received last time memorized by memory is compared with the identification code of data received this time and it is in agreement, In the data communication unit equipped with a means to add and broadcast the same identification code again to a means to return a retransmission-of-message demand to a transmitting agency when reception of data goes wrong, and the data demanded when a retransmission-of-message demand was received from a transmission place A means to add the retransmission-of-message code which indicates that it is retransmission of message to retransmission-of-message data in case the data by which the retransmission-of-message demand was carried out are transmitted, The data communication unit characterized by having a means to cancel the data received this time when it distinguished whether the retransmission-of-message code is added to received data when the identification code of received data is last time in agreement with the identification code of data, and the retransmission-of-message code was added.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] In order that this invention may relate to a data communication unit and may
prevent double treating and the data omission of data in detail, it relates to the data communication unit
which adds the identification code for distinguishing from other data to transmit data.
[0002]
[Description of the Prior Art] In the data transmission between the conventional communication devices,
it is common to transmit and receive data, taking a response check mutually by the transmitting side and
the receiving side. That is, in the transmitting side, it is checking whether the receiving side has received
the data normally by the response indication from a receiving side after transmitting data. In the
transmitting side, the case of the information which shows that the response indication from a receiving
side failed in reception, or when no response comes on the contrary during 1 scheduled time (no
response), the same data are transmitted again (resending) and data are made to be received by the
receiving side certainly.
[0003] As a case of a no response, although the case where the data from a transmitting side do not
reach a receiving side by a certain cause, and the receiving side returned the response indication which
receives data normally and shows that to the transmitting side, they can consider the case where the
response indication does not reach a transmitting side by a certain cause. Although the receiving side
received data normally in the case of the latter, a transmitting side will judge it as a no response, the
same data will be resent, and a receiving side will also process the same data to a duplex.
[0004] Then, these people proposed the data communication unit of a publication to JP,3-29215,B, in
order to solve this trouble. From a transmitting side, this equipment adds the number information
distinguished from other data to transmit data, and is transmitted to it. Thereby, in a receiving side, the
number information on the received data is compared with the number information on the data received
to last time, and if the same, the data will be canceled noting that it is processing ending, and will
prevent double treating. As number information added to data here, the code of the fixed length who
changes his value one by one is used periodically. For example, if initial value is set to 1, then it is
referred to as 2, 3, 4, ..., n (maximum) and Maximum n is reached, return and henceforth will repeat and
use the value of 2, 3, 4, ..., n for 2 of the next value of initial value.
[0005] That is, when a sending set stopped and reboots by forming number information so that it may
not be in agreement with the 1st it in the number information sent out to 2nd henceforth while forming
the predetermined number which should be sent out to the 1st time, whenever the zero clearance (at the
time of starting and a reboot) of the memory for number information storage is carried out, it is for
making it not become the same as the number information transmitted before the halt. Moreover, when it
doubles, having used the communication device as daily use and a reserve (duplex), and a daily use side
is downed, a reserve side replaces a daily use side and data are transmitted, it is for making it not
become the same as the number information which the daily use side had transmitted until now.
[0006]

[Problem(s) to be Solved by the Invention] However, although it is very few cases in the above-mentioned approach, the 1st number information is added, and when a sending set stops by power off etc. before transmitting the data which added the number information on 2nd henceforth after transmitting data, the data which added the 1st number information again at the time of a reboot will be transmitted. In this case, a receiving set may judge that the number information received this time is the same as the number information received last time, although the last received data and the last contents differ from each other, it may cancel data, and it may generate the phenomenon of a data omission as a result. The place which it was made in order that this invention might solve the above-mentioned trouble, and is made into the purpose is to offer the data communication unit which can always prevent a data omission, even if it is at the reboot time after a halt.
[0007]
[Means for Solving the Problem] A means to add the identification code from which the 1st invention changes cyclically for every transmission of data in order to attain the above-mentioned purpose to transmit data, A means to read the identification code added to the received data, and to memorize in memory, A means to distinguish whether the identification code of data received last time memorized by memory is compared with the identification code of data received this time, and it is in agreement, In the data communication unit equipped with a means to cancel the data received this time when identification code was in agreement It is characterized by having a means to supervise other equipments while transmitting data to self-equipment, and to detect a halt of other equipments, and a means to eliminate the identification code memorized by the memory in self-equipment when a halt of other equipments is detected.
[0008] A means to add the identification code from which the 2nd invention changes cyclically for every transmission of data to transmit data, A means to read the identification code added to the received data, and to memorize in memory, A means to cancel the data received this time when the identification code of data received last time memorized by memory is compared with the identification code of data received this time and it is in agreement, In the data communication unit equipped with a means to add and broadcast the same identification code again to a means to return a retransmission-of-message demand to a transmitting agency when reception of data goes wrong, and the data demanded when a retransmission-of-message demand was received from a transmission place A means to add the retransmission-of-message code which indicates that it is retransmission of message to retransmission-of-message data in case the data by which the retransmission-of-message demand was carried out are transmitted, When it distinguishes whether the retransmission-of-message code is added to received data when the identification code of received data is last time in agreement with the identification code of data, and the retransmission-of-message code is added, it is characterized by having a means to cancel the data received this time.
[0009]
[Function] In the 1st invention, while having received the transmit data, other equipments while transmitting data to self-equipment are supervised. If a halt of other equipments is detected here, the identification code memorized by the memory in self-equipment will be eliminated. Then, when it reboots after other equipments stopped, even if the identification code added to the data transmitted to a degree is the same as the thing of data which transmitted last time by chance, it is not distinguished that the self-equipment which received it is the same code since the last identification code is eliminated, and received data are not canceled.
[0010] In the 2nd invention, reception of data goes wrong, and when a retransmission-of-message demand is returned to a transmitting agency and broadcasts data again, a retransmission-of-message code is added to retransmission-of-message data. When retransmission-of-message data are received and the identification code is in agreement with the last received data, if it is distinguished and added further whether the retransmission-of-message code is added, it will be considered that the data is what overlaps received data last time, and it will be canceled.
[0011]
[Example] Hereafter, the example of this invention is explained along drawing. drawing 1 and drawing 2

are flow charts which show the example of the 1st invention and with which it comes out, and it is, and drawing 1 shows a send action and drawing 2 shows reception actuation. similarly, drawing 3 and drawing 4 are flow charts which show the example of the 2nd invention and with which it comes out, and it is, and drawing 3 shows the important section of a send action, and drawing 4 shows reception actuation. The data communication unit of these examples shows the processing actuation in the case of carrying out data transfer with the equipment of another side from one equipment among one pair of data communication units equipped with the same transceiver function as a transmitting side and a receiving side, respectively.

[0012] That is, the sending set used here memorizes the number information which is identification code at least to the predetermined field of an internal memory, and has the function which adds and sends out the resending information which is a retransmission-of-message code to transmit data at the time of this information and resending. Moreover, a receiving set has the function which memorizes the last value of the number information transmitted at least, and carries out the zero clearance of the value last time when a sending set stops with the function to cancel data this time when this is checked [this time / a value] and it is in agreement. Here, the illustration about these functions was omitted. In the data transmitting processing in drawing 1 and the flow chart of drawing 3 , the response indication from a receiving set is checked after data transmission, in a normal response, a Request to Send and a resending demand are reset, and the processing which a Request to Send is reset in a no response or an abnormality response, and sets a resending demand is included.

[0013] The example of the 1st invention is explained to the beginning. When a halt of a sending set was detected in the receiving set, it was presupposed to this example that the zero clearance of the number information storing memory in equipment is carried out. First, the send action is explained with reference to drawing 1 . The zero clearance of an internal memory is performed at the time of starting or a reboot (S11). Subsequently, the existence of a Request to Send is judged (S12), and if it is with a demand, the contents of number information storing memory (transmitting sequence number storing memory) will be read (S13). When you have no demand, decision of S12 is repeated. the number information which adds them to the data transmitted to the 1st time by processing of S1 here since the contents of memory are "0" -- processing of S14 -- "1" -- it is added and is set to "1."

[0014] The result is shown as A. Transmission of data is performed after adding this number information to transmit data (S17), while it judges whether the maximum (here, 15 is chosen) which A should use as a result is exceeded (S15), and writing A in the above-mentioned number information memory, when having not exceeded (S18). Renewal of memory is performed like the following, if A> 15 is materialized in S15, A will be set to "2" (S16) and, as for the following, transmission of data will be performed similarly. That is, only the 1st time is set to "1" and "2"- "15" will be transmitted cyclically 2nd henceforth.

[0015] Next, the reception actuation is explained with reference to drawing 2 . It is supervising whether a receiving set always has a sending set in a idle state (S21). Here, when a sending set is in activation status, performance information shall be transmitted the fixed period. When it is judged that a receiving set has a sending set in a idle state, the zero clearance of the number information memory in equipment (last transmitting sequence number storing memory) is carried out (S27). When a sending set is activation status (S21N) next, it distinguishes whether data were received or not (S22), and when having received data, read-out of number information which received last time from receiving memory is performed (S23). The number information received this time is compared with the last number information read from this receiving memory (S24). When both are in agreement, that is returned to a sending set, but (S28) a response is returned to a sending set, after updating memory (S25) and performing predetermined processing based on received data using this number information (S26), when not in agreement (S28).

[0016] Consequently, when the response from a receiving set disappears by a certain cause and does not reach a sending set, a sending set will attach the same number again, transmit data will be transmitted, but since this data is canceled as mentioned above, double treating is not carried out. Moreover, even if it stops after transmitting the data with which the zero clearance of the number information memory in a

receiving set is carried out during the halt when a sending set will be in activation status to a idle state and it reboots after that, and the sending set added the transmitting sequence number "1" even if, and it adds the transmitting sequence number "1" again at the time of a reboot, it is not last time in agreement with a value accidentally, and data are not canceled. In addition, although 1 is set as initial value only at the time of starting and it is henceforth repeated from 2 in this example, even if it repeats from 1, it can operate convenient in this example.

[0017] Next, the example of the 2nd invention is explained. A sending set receives the response indication of a no response or reception failure from a receiving set, and this example adds the resending information which is a retransmission-of-message code, when continuing the data which added the same number information and transmitting (resending). It is made not to cancel, if resending information is added, and the data is canceled and it is not added, when a receiving set continues the same number information by that cause and it receives. Concrete actuation is explained with reference to drawing 3 . In addition, since the send action is the same as that of drawing 1 , explanation is omitted. First, it judges whether a sending set needs to be resent as a result of the last data transmission (S31). When resending is required, the number information stored at the time of the last transmission is read from number information memory (S32). Transmission of data is performed after adding the resending information which shows that they are this number information and resending data to transmit data (S33) (S34).

[0018] Next, the reception actuation is explained with reference to drawing 4 . First, it distinguishes whether data were received or not (S41), and when having received data, read-out of number information which received last time from receiving memory is performed (S42). The number information received this time distinguishes whether resending information is added to received data, when it is compared with the last number information read from this receiving memory (S43) and both are in agreement (S45). That is returned to a sending set when resending information is added (S47). A response is returned to a sending set after performing predetermined processing based on received data (S46), when not added (S47). A response is returned to a sending set, after updating memory (S44) and performing predetermined processing based on received data using (S43N) and this number information (S46), when this number information and the last number information are not in agreement (S47).

[0019] Consequently, when the response from a receiving set disappears by a certain cause and does not reach a sending set, a sending set will attach the same number and resending information again, transmit data will be transmitted, but since this data is canceled as mentioned above, double treating is not carried out. Moreover, a sending set will be from activation status in a idle state, after that, only number information will be added to the data of the beginning when rebooting, and resending information will be transmitted to them, without adding. Therefore, since resending information is not added even if it stops after transmitting the data with which the sending set added the transmitting sequence number "1" even if, and it transmits the data of the transmitting sequence number "1" again at the time of a reboot, data are not canceled accidentally.

[0020]

[Effect of the Invention] As stated above, when a halt by the power interruption of a transmitting agency etc. is detected by supervising the equipment of the transmitting origin which has transmitted data during reception of data according to the 1st invention, the identification code of the received data memorized by the memory in self-equipment is eliminated. Even if it reboots after that, it adds the same identification code as the data transmitted before the halt and it transmits new data, canceling accidentally the data received to the beginning of a receiving side is lost, and it can prevent generating of a data omission.

[0021] When according to the 2nd invention reception of data goes wrong and retransmission of message is required, a transmitting agency In order to add and broadcast a retransmission-of-message code again to retransmission-of-message data, at the transmission place which received the data Even if the identification code of data is the same as that of the last thing, only when it distinguishes whether the retransmission-of-message code is added further and the retransmission-of-message code is added, it is regarded as duplicate data and received data are canceled. Consequently, it is canceled and the thing by which it was first received after the reboot of a transmitting side and for which retransmission-of-

message data make a mistake in the identification code of data, and it is usually canceled even when last time the same as received data by chance can prevent generating of a data omission.

[Translation done.]

TECHNICAL FIELD

[Industrial Application] In order that this invention may relate to a data communication unit and may
prevent double treating and the data omission of data in detail, it relates to the data communication unit
which adds the identification code for distinguishing from other data to transmit data.

[Translation done.]

PRIOR ART

[Description of the Prior Art] In the data transmission between the conventional communication devices, it is common to transmit and receive data, taking a response check mutually by the transmitting side and the receiving side. That is, in the transmitting side, it is checking whether the receiving side has received the data normally by the response indication from a receiving side after transmitting data. In the transmitting side, the case of the information which shows that the response indication from a receiving side failed in reception, or when no response comes on the contrary during 1 scheduled time (no response), the same data are transmitted again (resending) and data are made to be received by the receiving side certainly.

[0003] As a case of a no response, although the case where the data from a transmitting side do not reach a receiving side by a certain cause, and the receiving side returned the response indication which receives data normally and shows that to the transmitting side, they can consider the case where the response indication does not reach a transmitting side by a certain cause. Although the receiving side received data normally in the case of the latter, a transmitting side will judge it as a no response, the same data will be resent, and a receiving side will also process the same data to a duplex.

[0004] Then, these people proposed the data communication unit of a publication to JP,3-29215,B, in order to solve this trouble. From a transmitting side, this equipment adds the number information distinguished from other data to transmit data, and is transmitted to it. Thereby, in a receiving side, the number information on the received data is compared with the number information on the data received to last time, and if the same, the data will be canceled noting that it is processing ending, and will prevent double treating. As number information added to data here, the code of the fixed length who changes his value one by one is used periodically. For example, if initial value is set to 1, then it is referred to as 2, 3, 4, ..., n (maximum) and Maximum n is reached, return and henceforth will repeat and use the value of 2, 3, 4, ..., n for 2 of the next value of initial value.

[0005] That is, when a sending set stopped and reboots by forming number information so that it may not be in agreement with the 1st it in the number information sent out to 2nd henceforth while forming the predetermined number which should be sent out to the 1st time, whenever the zero clearance (at the time of starting and a reboot) of the memory for number information storage is carried out, it is for making it not become the same as the number information transmitted before the halt. Moreover, when it doubles, having used the communication device as daily use and a reserve (duplex), and a daily use side is downed, a reserve side replaces a daily use side and data are transmitted, it is for making it not become the same as the number information which the daily use side had transmitted until now.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] As stated above, when a halt by the power interruption of a transmitting agency
etc. is detected by supervising the equipment of the transmitting origin which has transmitted data
during reception of data according to the 1st invention, the identification code of the received data
memorized by the memory in self-equipment is eliminated. Even if it reboots after that, it adds the same
identification code as the data transmitted before the halt and it transmits new data, canceling
accidentally the data received to the beginning of a receiving side is lost, and it can prevent generating
of a data omission.
[0021] When according to the 2nd invention reception of data goes wrong and retransmission of
message is required, a transmitting agency In order to add and broadcast a retransmission-of-message
code again to retransmission-of-message data, at the transmission place which received the data Even if
the identification code of data is the same as that of the last thing, only when it distinguishes whether the
retransmission-of-message code is added further and the retransmission-of-message code is added, it is
regarded as duplicate data and received data are canceled. Consequently, it is canceled and the thing by
which it was first received after the reboot of a transmitting side and for which retransmission-of-
message data make a mistake in the identification code of data, and it is usually canceled even when last
time the same as received data by chance can prevent generating of a data omission.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, although it is very few cases in the above-mentioned approach, the 1st number information is added, and when a sending set stops by power off etc. before transmitting the data which added the number information on 2nd henceforth after transmitting data, the data which added the 1st number information again at the time of a reboot will be transmitted. In this case, a receiving set may judge that the number information received this time is the same as the number information received last time, although the last received data and the last contents differ from each other, it may cancel data, and it may generate the phenomenon of a data omission as a result. The place which it was made in order that this invention might solve the above-mentioned trouble, and is made into the purpose is to offer the data communication unit which can always prevent a data omission, even if it is at the reboot time after a halt.

[Translation done.]

MEANS

[Means for Solving the Problem] A means to add the identification code from which the 1st invention
changes cyclically for every transmission of data in order to attain the above-mentioned purpose to
transmit data, A means to read the identification code added to the received data, and to memorize in
memory, A means to distinguish whether the identification code of data received last time memorized by
memory is compared with the identification code of data received this time, and it is in agreement, In the
data communication unit equipped with a means to cancel the data received this time when identification
code was in agreement It is characterized by having a means to supervise other equipments while
transmitting data to self-equipment, and to detect a halt of other equipments, and a means to eliminate
the identification code memorized by the memory in self-equipment when a halt of other equipments is
detected.

[0008] A means to add the identification code from which the 2nd invention changes cyclically for every
transmission of data to transmit data, A means to read the identification code added to the received data,
and to memorize in memory, A means to cancel the data received this time when the identification code
of data received last time memorized by memory is compared with the identification code of data
received this time and it is in agreement, In the data communication unit equipped with a means to add
and broadcast the same identification code again to a means to return a retransmission-of-message
demand to a transmitting agency when reception of data goes wrong, and the data demanded when a
retransmission-of-message demand was received from a transmission place A means to add the
retransmission-of-message code which indicates that it is retransmission of message to retransmission-
of-message data in case the data by which the retransmission-of-message demand was carried out are
transmitted, When it distinguishes whether the retransmission-of-message code is added to received data
when the identification code of received data is last time in agreement with the identification code of
data, and the retransmission-of-message code is added, it is characterized by having a means to cancel
the data received this time.

[Translation done.]

OPERATION

[Function] In the 1st invention, while having received the transmit data, other equipments while transmitting data to self-equipment are supervised. If a halt of other equipments is detected here, the identification code memorized by the memory in self-equipment will be eliminated. Then, when it reboots after other equipments stopped, even if the identification code added to the data transmitted to a degree is the same as the thing of data which transmitted last time by chance, it is not distinguished that the self-equipment which received it is the same code since the last identification code is eliminated, and received data are not canceled.

[0010] In the 2nd invention, reception of data goes wrong, and when a retransmission-of-message demand is returned to a transmitting agency and broadcasts data again, a retransmission-of-message code is added to retransmission-of-message data. When retransmission-of-message data are received and the identification code is in agreement with the last received data, if it is distinguished and added further whether the retransmission-of-message code is added, it will be considered that the data is what overlaps received data last time, and it will be canceled.

[Translation done.]

EXAMPLE

[Example] Hereafter, the example of this invention is explained along drawing. drawing 1 and drawing 2
are flow charts which show the example of the 1st invention and with which it comes out, and it is, and
drawing 1 shows a send action and drawing 2 shows reception actuation. similarly, drawing 3 and
drawing 4 are flow charts which show the example of the 2nd invention and with which it comes out,
and it is, and drawing 3 shows the important section of a send action, and drawing 4 shows reception
actuation. The data communication unit of these examples shows the processing actuation in the case of
carrying out data transfer with the equipment of another side from one equipment among one pair of
data communication units equipped with the same transceiver function as a transmitting side and a
receiving side, respectively.
[0012] That is, the sending set used here memorizes the number information which is identification code
at least to the predetermined field of an internal memory, and has the function which adds and sends out
the resending information which is a retransmission-of-message code to transmit data at the time of this
information and resending. Moreover, a receiving set has the function which memorizes the last value of
the number information transmitted at least, and carries out the zero clearance of the value last time
when a sending set stops with the function to cancel data this time when this is checked [this time / a
value] and it is in agreement. Here, the illustration about these functions was omitted. In the data
transmitting processing in drawing 1 and the flow chart of drawing 3 , the response indication from a
receiving set is checked after data transmission, in a normal response, a Request to Send and a resending
demand are reset, and the processing which a Request to Send is reset in a no response or an abnormality
response, and sets a resending demand is included.
[0013] The example of the 1st invention is explained to the beginning. When a halt of a sending set was
detected in the receiving set, it was presupposed to this example that the zero clearance of the number
information storing memory in equipment is carried out. First, the send action is explained with
reference to drawing 1 . The zero clearance of an internal memory is performed at the time of starting or
a reboot (S11). Subsequently, the existence of a Request to Send is judged (S12), and if it is with a
demand, the contents of number information storing memory (transmitting sequence number storing
memory) will be read (S13). When you have no demand, decision of S12 is repeated. the number
information which adds them to the data transmitted to the 1st time by processing of S1 here since the
contents of memory are "0" -- processing of S14 -- "1" -- it is added and is set to "1."
[0014] The result is shown as A. Transmission of data is performed after adding this number
information to transmit data (S17), while it judges whether the maximum (here, 15 is chosen) which A
should use as a result is exceeded (S15), and writing A in the above-mentioned number information
memory, when having not exceeded (S18). Renewal of memory is performed like the following, if A>
15 is materialized in S15, A will be set to "2" (S16) and, as for the following, transmission of data will
be performed similarly. That is, only the 1st time is set to "1" and "2"- "15" will be transmitted
cyclically 2nd henceforth.
[0015] Next, the reception actuation is explained with reference to drawing 2 . It is supervising whether
a receiving set always has a sending set in a idle state (S21). Here, when a sending set is in activation

status, performance information shall be transmitted the fixed period. When it is judged that a receiving set has a sending set in a idle state, the zero clearance of the number information memory in equipment (last transmitting sequence number storing memory) is carried out (S27). When a sending set is activation status (S21N) next, it distinguishes whether data were received or not (S22), and when having received data, read-out of number information which received last time from receiving memory is performed (S23).

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the flow chart which shows the send action of the example concerning the 1st invention.
[Drawing 2] It is the flow chart which shows reception actuation of the example concerning the 1st invention.
[Drawing 3] It is the flow chart which shows the send action of the example concerning the 2nd invention.
[Drawing 4] It is the flow chart which shows reception actuation of the example concerning the 2nd invention.

[Translation done.]

DRAWINGS

[Drawing 1]

S11 通信装置内部メモリ
零クリア

S12 送信要求有り？ N

Y

S13 送信順序番号格納
メモリ読出し

S14 読出しデータを＋1
→A

S15 A＞15？ Y

N

S16 2→A

S17 Aを送信順序番号格納
メモリに書込むと共に
送信データに付加

S18 データ送信処理

[Drawing 3]

```
                    ▽
                    │
  S31              ╱│╲
   N      ┌───────╱     ╲───────┐
 ←────────┤       再送要求有り？  │
 │        └───────╲     ╱───────┘
 │                 ╲  │ ╱
 │                  ╲ │Y
 │                    │
 │  S32  ┌────────────────────┐
 │       │  送信順序番号格納    │
 │       │  メモリ読出し        │
 │       └────────────────────┘
 │                    │
 │  S33  ┌────────────────────┐
 │       │  送信順序番号と再送情 │
 │       │  報を送信データに付加 │
 │       └────────────────────┘
 │                    │
 │  S34  ┌────────────────────┐
 │       │  データ送信処理      │
 │       └────────────────────┘
 │                    │
 └───────────────────→│
                      │
                      △
```

[Drawing 2]

```
                      ▽

S21
    Y          送信装置停止中？
                      │N

S22                                  N
             データ受信？
                      │Y

S23    ┌──────────────┐
       │前回送信順序番号   │
       │格納メモリ読出し   │
       └──────────────┘

S24          今回受信した送信        Y
             順序番号は前回の
             順序番号と同じ？
                      │N

S25    ┌──────────────┐
       │今回受信した送信順序 │
       │番号を前回送信順序番 │
       │号格納メモリに書込む │
       └──────────────┘

S26    ┌──────────────┐
       │受信データ処理     │
       └──────────────┘

S27 ┌──────────────┐
    │前回送信順序番号格  │
    │納メモリ零クリア    │
    └──────────────┘

S28    ┌──────────────┐
       │送信装置に応答返送  │
       └──────────────┘

                      △
```

[Drawing 4]

```
                              ▽

      ┌──────────────►
      │           S41      ╱‾‾‾‾‾‾‾‾‾‾‾╲
      │            N ◄────〈  データ受信？ 〉
      │                    ╲_____╱
      │                          │ Y
      │           S42      ┌──────┴──────┐
      │                    │ 前回送信順序番号 │
      │                    │ 格納メモリ読出し │
      │                    └──────┬──────┘
      │                           │
      │           S43      ╱‾‾‾‾‾‾‾‾‾‾‾╲
      │            Y ◄────〈 今回受信した送信 〉
      │            │       〈 順序番号は前回の 〉
      │            │        ╲ 順序番号と同じ？╱
      │            │              │ N
      │            │       ┌──────┴──────┐
      │            │  S44  │ 今回受信した送信順序 │
      │            │       │ 番号を前回送信順序番 │
      │            │       │ 号格納メモリに書込む │
      │    S45     │       └──────┬──────┘
      │ ╱‾‾‾‾‾‾‾‾╲ │              │
      │〈 受信データに再送 〉 N ───────►│
      │〈 情報が付加されて 〉         │
      │ ╲ いるか？ ╱               │
      │      │ Y                  │
      │      │         S46  ┌──────┴──────┐
      │      │              │  受信データ処理  │
      │      │              └──────┬──────┘
      │      └─────────────────────►│
      │                            │
      │                 S47  ┌──────┴──────┐
      │                      │ 送信装置に応答返送 │
      │                      └──────┬──────┘
      │                            │
                                   ▽
```
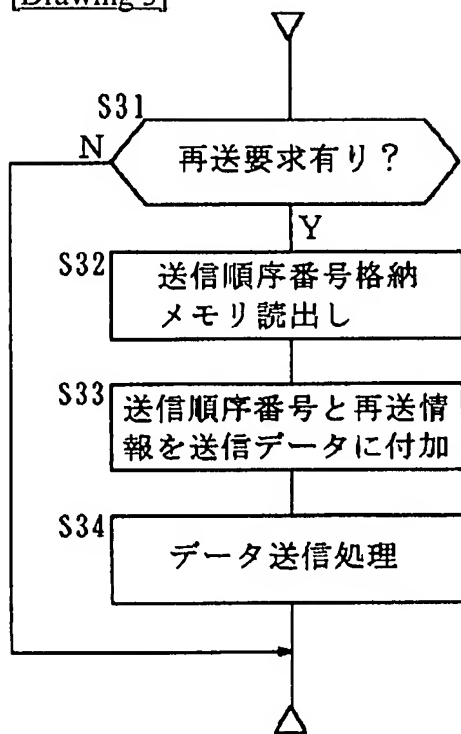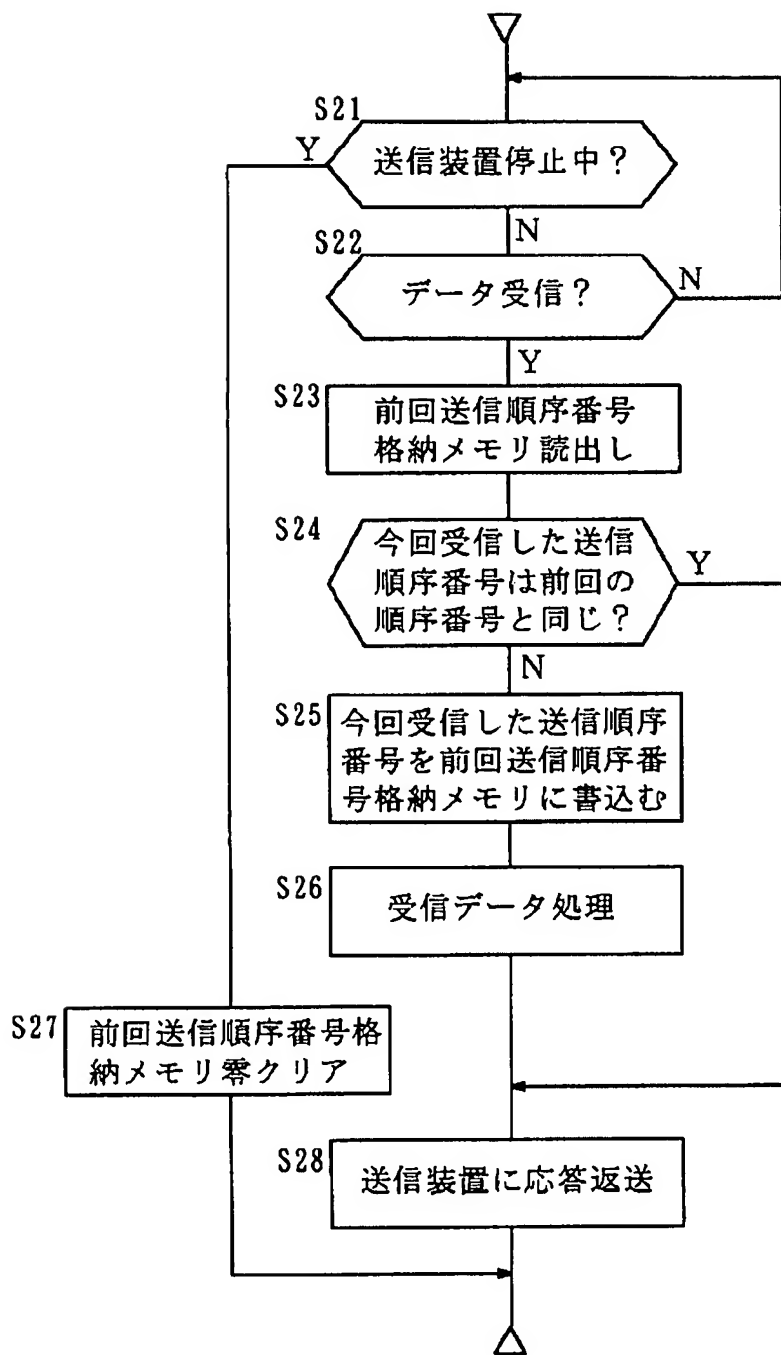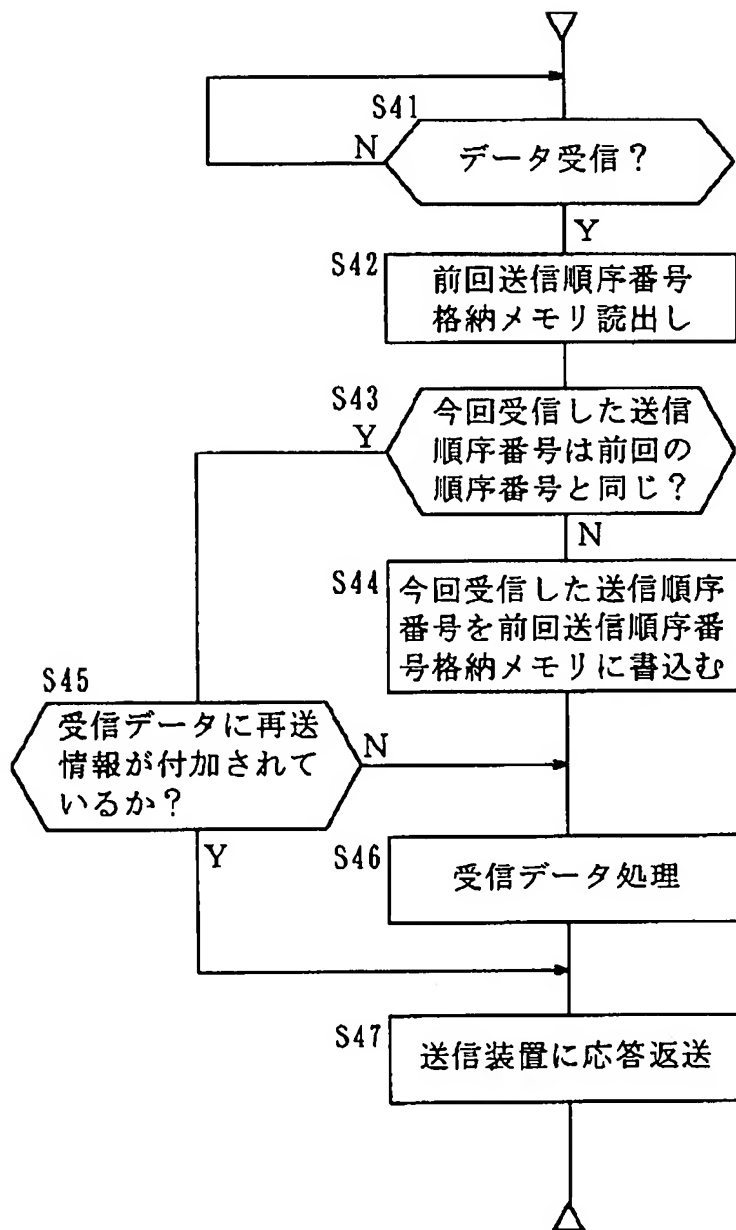
[Translation done.]